

Crosslinking of polyolefin foams: I. Effect of triallyl cyanurate on dicumyl peroxide crosslinking of low-density polyethylene

Abstract

This study investigates peroxide crosslinking of two low-density polyethylene grades of similar number average molecular weight but differing molecular weight distribution. At gel contents typically associated with dicumyl peroxide (DCP) crosslinked foams, crosslinking and melt tensile properties of the solid matrix, foaming behaviour and foam properties were not significantly different. The main work compared the effects of crosslinking systems based on DCP alone and DCP with the polyfunctional monomer, triallylcyanurate (TAC). The presence of TAC allowed specific gel contents to be achieved at significantly reduced DCP concentrations compared with DCP alone. It was also determined that cost-effective use of TAC was limited to approximately 0.5 parts per hundred resin. When comparing results of solid and foamed samples of identical gel content, the presence of TAC significantly increases the melt modulus and reduces extensibility of the solid matrix compared with DCP alone and promotes a higher nucleation density in foam. This is considered to be due to a higher crosslink density in the network fraction which introduces complications in prediction of foaming behaviour if gel content alone is considered.